Welcome!

Welcome to the ASHRAE TC 9.9 Hybrid In-Person/Virtual Meeting!

No need to say hello, we will begin promptly at 2:30 pm EST

High Level Agenda

- Welcome
- Introduction
- Membership
- Purpose & Scope
- Reorganization
- Liaison Reports
- Research
- IT Subcommittee
- Work Sessions

Housekeeping

Audio

- Attendees are muted upon entry
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Video

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Q&A

- Use the chat function to ask questions
- Our moderator will share questions throughout the presentation with the speaker to answer.
- If you need to speak, please use the Raise Hand button and the moderator will enable your microphone.

Attendance

- Please complete the attendance form found at the URL at the bottom of this slide or use the QR code below.

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Winter Conference 2023

Main Meeting

Hybrid In-Person/Virtual

Attendance: https://forms.gle/1TAR6b1xWtmqnCQ67

Agenda

Monday, February 6, 2023
TC 9.9 Main Meeting
2:30 PM – 7:00 PM EST
Location: Hybrid In-Person / Virtual

Topic		Time	Presenter(s)	In-or
Welcome	Welcome, Agenda Review, Hybrid Meeting Etiquette	5	John Groenewold	
Introductions	Introductions of All In-Person Attendees, Officers, Voting Members and Subcommittee Chairs	10	John Groenewold	
Membership	Details of TC 9.9 Membership	5	John Groenewold	
TC 9.9 Purpose & Scope	Review of TC 9.9 Original Purpose and Scope	10	John Groenewold & Don Beaty	
Reorganization	Discussion of Committee and Publications Reorganization ASHRAE Publications	40	Don Beaty, John Groenewold, Mark Owens	
Liaison Reports				
	Standard 90.1 & 90.4	5	Rick Pavlak	
	SPC-127	5	David McGlocklin	
	AHRI 1360	5	David McGlocklin	
	SSPC 300, Guideline 1.6	5	Terry Rodgers	
	Decarbonization Task Force	5	Lixia Wu	
	MTG.CYB	5	Ecton English	
	DOE / LBNL	10	Steven Greenberg	
Break		20		
Research	Research Committee Update	20	Mark Seymour	
IT Subcommittee	IT Subcommittee Update Liquid Pressure Test for Servers Corrosion Research Liquid Cooling Book Status Plan for Updating Power Trends	45	Roger Schmidt	
Break		15		
Workshop	IT Subcommittee Workshop	70		
	Total Time:	270	Minutes	

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Virtual Meeting Etiquette

- Do not share your video due to the high number of virtual participants.
- Prior to speaking individuals should state their name so that others know who is speaking and speak into a microphone.
- Virtual participants should keep yourself muted unless giving permission to speak by the Host via chat.
- Please do not attempt to share your screen without being asked to do so by the Host or Co-Host.
- In-person participants are discouraged from joining the virtual meeting due to wireless bandwidth constraints.

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Virtual Meeting Housekeeping

Virtual Host: Vice Chair - Matt Koukl

- Monitor the chat thread for questions and comments.
- Mute and Unmute Virtual Participants and Guests.
- Manage discussions and voting.
- Manage screensharing and in-person presentation

Virtual Co-Host: Secretary - Mark Steinke

- Monitor time and keep the meeting on schedule.
- Record the event.
- Produce meeting minutes.
- Will repeat the attendance link multiple times during the meeting and upon chat request.
- Respond to audio problems.

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

In Person Setup

- Video projector that displays the presentation being shared virtually.
- There are audio speakers in the room but unmuted virtual commentors may not be immediately connected. Please be patient.

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Attendance

ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2023 Winter Meeting

Programs, Research, & Publications
Virtual Event Timing: Sunday February 5, 2023; 6:00-8:00 pm ET
Event Address: Link
Meeting ID: 225 016 118 130
Passcode: 7zUxeq

Virtual Event Timing: February 6, 2023; 2:30 - 7:00 pm ET
Event Address: Link
Meeting ID: 268 959 024 61
Passcode: YpPqdW

Contact us at tc99chair@gmail.com
Technical Committee Website: http://tc0909.ashraetcs.org

Attendance is being recorded using a Google Form. Please make sure you complete the form at:

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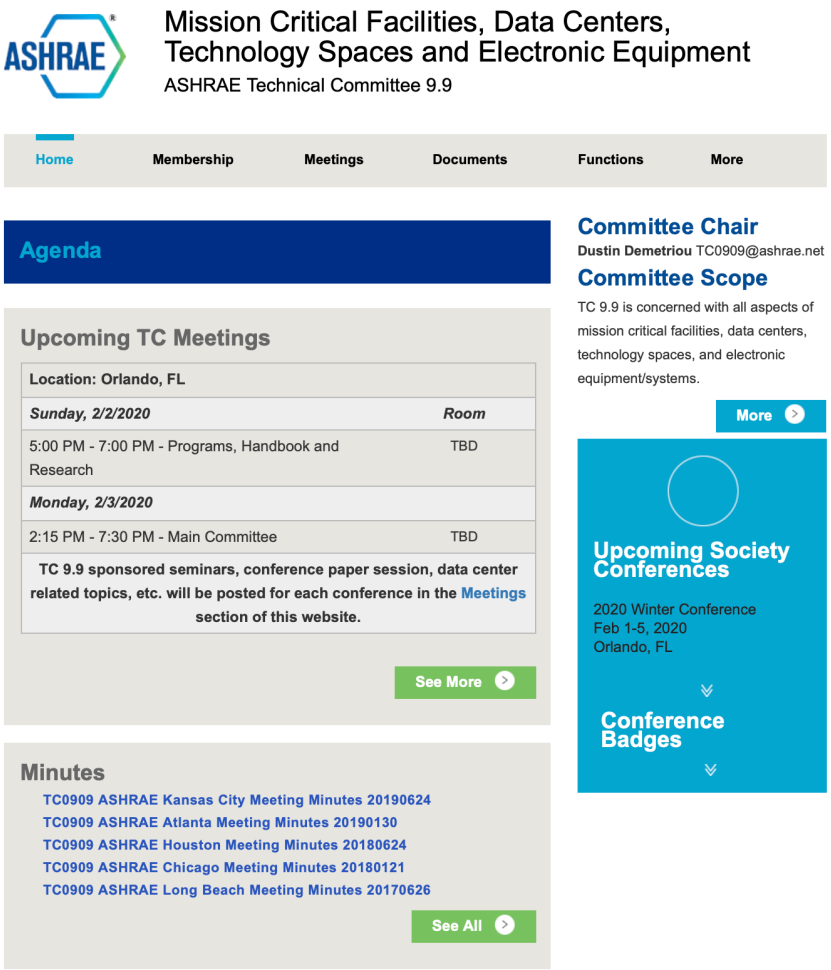
Or use the QR Code below:

TC 9.9 Webpage



http://tc0909.ashraetcs.org

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

ASHRAE TC 9.9 Overview

Title

- Mission Critical Facilities, Data Centers, Technology Spaces, and Electronic Equipment

Purpose

- To be recognized by ALL areas of the datacom industry as the UNBIASED engineering leader in HVAC and an effective provider of technical datacom information.

Scope

- All things datacom facilities: datacom refers to data processing and communication facilities. It includes rooms or closets used for communication, computers, or electronic equipment

TC 9.9 Officers

Chair		John Groenewold, *Vantage Data Centers*
Vice Chair		Matt Koukl, *Affiliated Engineers*
Secretary		Mark Steinke, *AMD*
Publications Chair		Don Beaty, Retired Founder/CEO of DLB Associates
Research Subcommittee Chair		Mark Seymour, *Future Facilities*
ITE Subcommittee Chair		Dr. Roger Schmidt, *IBM Fellow Emeritus* *Syracuse University*
Standards Subcommittee Chair		Rick Pavlak, *Heapy Engineering Retired*
Program Subcommittee Chair		Nick Gangemi, *Northern Air Systems*
Handbook Subcommittee Chair		Robert McFarlane, *Shen Milsom & Wilke, LLC*
Webmaster		Ecton English, *Department of Defense*
Marketing Subcommittee Chair		Paul Finch, *KAO Data*

TC 9.9 Liaisons

- Standard 90.1: Rick Pavlak
- Standard 90.4: Dave Kelley
- Standard 127: John Bean
- AHRI 1360: David McGlocklin
- Standard 300, Guideline 1.6: Terry Rodgers
- International: Don Beaty
- MTG.CYB: Ecton English

Voting Members

1. John Groenewold, Vantage Data Centers
2. Dave Moss, Dell (retired)
3. John Gross, J.M. Gross Engineering
4. Matt Koukl, Affiliated Engineers
5. Dave Kelley, Vertiv
6. Mark Monroe, Microsoft
7. Rick Pavlak, Heapy
8. Mark Steinke, AMD
9. Paul Finch, KAO Data
10. Mark Seymour, Cadence Design Systems
11. Jason Matteson, Iceotope Technologies
12. David Quirk, DLB Associates
13. Joe Prisco, IBM
14. Bob McFarlane, Shen Milsom & Wilke
15. Lixia Wu, Cushman & Wakefield

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

2022-2023 Votes

Vote	Date	Approved
1675-RP Approval of Final Report	3/4/2022	Yes
Proposed Thermal Guidelines 5th Ed Revision – Include Classes B and C	5/7/2022	Yes
Adoption of 2022 Winter Meeting Minutes	6/5/2022	Yes
Adoption of 2021 Summer Meeting Minutes	6/5/2022	Yes
ASHRAE 2023 Applications Handbook Chapter 20	6/17/2022	Yes
Adoption of 2022 Summer Meeting Minutes	1/27/2023	Yes

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Membership Information

Provisional Corresponding Members

- Newly registered
- Implies participation in committee activities through correspondence or in-person involvement to become corresponding member
- Provisional corresponding members serves up to two, one-year terms
- Chair updates roster to move from provisional to corresponding
  - Roster update always due Tuesday following main meeting during Winter Conference
  - If the chair takes no action on a provisional member, they are dropped from the roster in two years
- Can not be voting members, but after provisional term, may be considered for future voting membership.'
- For purposes of committee assignments and other work "Provisional" status does not limit an individual's active involvement in the work of the committee

Corresponding Members (336 as of 1/2021)

- Full members
- Can be voting members
- Can be nominated/elected as an officer

Keep Your ASHRAE Profile Updated!

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Join TC 9.9

Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Technical Committee 9.9

Home | Membership | Meetings | Documents | Functions | More

Member Roster

Current as of 6/04/2020

Join TC 9.9

If you want to become a provisional corresponding member of this TC, click on the "Join TC" button above. You will be automatically added to the roster and will receive all TC communications.

Committee members can download a copy of the complete roster in any of three formats by logging in to their ASHRAE member account, clicking on my account and selecting Committees.

http://tc0909.ashraetcs.org/membership.php

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

Thank You

TC 9.9 Website

tc0909.ashraetcs.org

Committee & Publications Reorganization

Don Beaty, John Groenewold & Mark Owens

90.1 Liaison Report

Rick Pavlak

The 2022 edition of Standard 90.1 incorporates over 80 addenda to the 2019 edition. Major additions appearing for the first time in a minimum-efficiency U.S. model energy standard or code at the national level include:

- A minimum prescriptive requirement for on-site renewable energy
- An optional Mechanical System Performance Path allowing HVAC system efficiency tradeoffs based on the new total system performance ratio (TSPR) metric
- New requirements to address the impacts of thermal bridging

Other highlights include:

- An expanded scope to include sites as well as buildings
- New energy credit requirements for a customized approach to improving energy efficiency
- New informative guidance for using carbon emissions, site energy, or source energy as alternative performance metrics to the current energy cost metric
- Significant efficiency increases in IEER for commercial rooftops and a new SEER2/HSPF2 metric for <65kbtu sized air-cooled heat pumps.

90.4 Liaison Report

Rick Pavlak

Standard 90.4-2022 is out for publication. Consisting of addenda a, b, d, e, f, h, I to Standard 90.4-2019.

Standard 90.1-2022 includes by reference 90.4-2019 with addenda's a, b, d, e, f. Addenda's h and I were not published when Standard 90.1-2022 closed their addenda in order to publish.

Standard 90.4-2019 will be included by reference in the International Energy Conservation Code in its 2024 edition.

Addenda h made wide sweeping changes in the Electrical performance calculations. These include dropping the incoming service segment from the ELC calculation ; increasing UPS efficiency and updating ELC calculation examples.

Addenda g in-process increases the MLC scope to include heating and ventilating.

SSPC 127

David McGlocklin

SSPC 127

Method of Testing for Rating Air-Conditioning Units Serving Data Center and Other Information Technology Equipment Spaces

Purpose: The purpose of this standard is to establish a uniform set of test requirements for rating air conditioning units that are applied in DC and other ITE spaces.

Scope: This standard applies to classes of air conditioning units that are used to air condition DC and Other ITE spaces. Such units must be able to be tested using an air enthalpy method and facilitate heat transfer across at least one heat exchanger.

2023 Update & Plans:

All public comments have been answered and/or resolved.

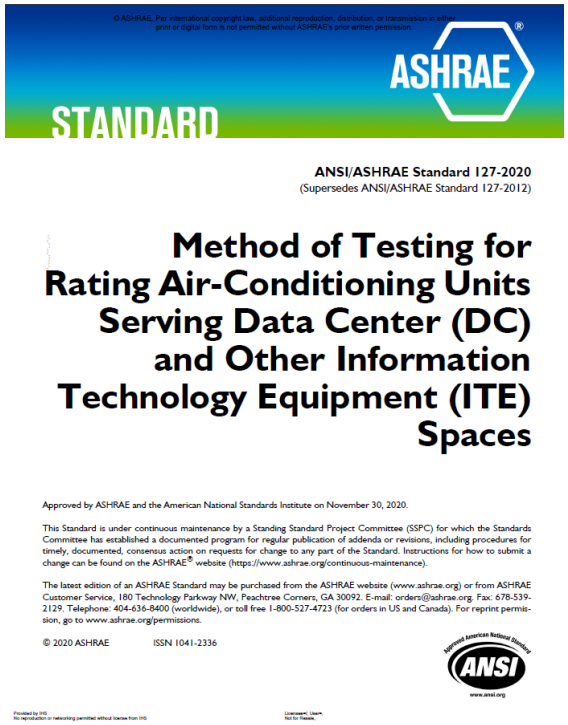
Committee balance was achieved so that we can take on new business, but we have had a hard time reaching quorum.

Committee will develop a work plan for 2023 and beyond.

Harmonization with AHRI 1360 standard & iNSenCOP

Revise TPS to include liquid cooling & start developing test method.

Call for members and interested parties. Meeting Tuesday 8-12 (Juniper - M2 North)



AHRI 1360

David McGlocklin

AHRI 1360

Performance Rating Standard for Datacom Air-Conditioning Units

Purpose: To establish for Computer and Data Processing Room Air Conditioners (CDPR): definitions; classification; test requirements; rating requirements; minimum data requirements for Published Ratings; marking and nameplate data; and conformance conditions.

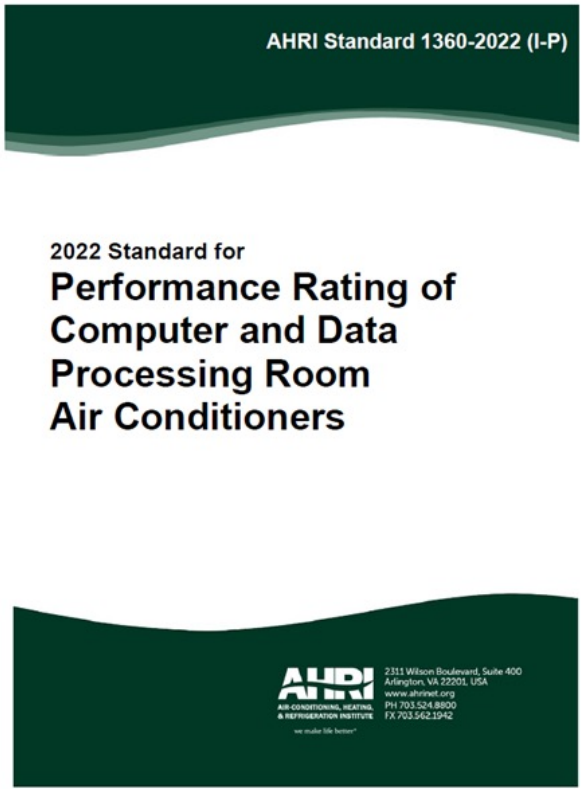
Scope: This standard applies to all CDPR units and is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors, users, and regulators.

Major Update: AHRI 1360 - 2022 and 1361- 2022 HAVE BEEN RELEASED after public peer review concluded in Dec 2022.

2023 Plans: Committee plans to turn our attention to work with SSPC 127 to harmonize the two standards and remove method of test items from 1360 that belong in 127.

This harmonization process to will also be done with ASHRAE 37 when it is updated this year.

Work with SSPC 127 & NRTLs to develop a way to test & model Integrated Sensible Coefficient of Performance (iNSenCOP).



SSPC 300, Guideline 1.6

Terry Rodgers

Decarbonization Building Task Force

Lixia Wu

Task Force for Building Decarbonization

- Formed in Spring 2021
- TFBD Key Objectives

- Expedite the delivery of technical resources that help design engineer deliver and operate low-carbon buildings

- Facilitate and oversee the work of Task Force subcommittees to ensure decarbonization goals are accomplished within the established timeframe

- Coordinate Task Force work with ASHRAE councils, committees and task forces to align goals and eliminate bottlenecks –TC liaisons on operational WGs

TFBD Technical Resources

TFBD Collaboration with TCs

- TC liaisons are critical for the success of these technical resources
- Schedules are compressed and timely reviews are essential
- TC9.9 Liaison: Dr. Lixia Wu, Email: Lixia.Wu@CushWake.com

Liaison assigned
Liaison requested

		TexCom	P&S SubC	Ops SubC Chair, VC	Retrofit	Heat Pump	Hospital	BPS	GIB	Whole Lief
TC6.09	Thermal Storage	X		X						
TC6.10	Fuels and Combustion				X					
TC7.01	Integrated Building Design		X							
TC7.03	Operation, Maintenance and Cost Management				X					
TC7.04	Exergy Analysis for Sustainable Buildings				X					
TC7.05	Smart Building Systems (orig. TC 4.11 & TC 7.4)				X	X			X	
TC7.06	Building Energy Performance	X			X			X	X	
TC7.09	Building Commissioning			X	X		X	X		
TC8.10	Mechanical and Desiccant Dehumidification Equipment, Heat Pipes and Components					X				
TC8.11	Unitary and Room Air Conditioners and Heat Pumps (orig. TC 7.6)					X				
TC9.06	Healthcare Facilities						X	X		
TC9.07	Educational Facilities				X					
TC9.09	Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment				X			X		
TC9.10	Laboratory Systems						X			
TC9.12	Tall Buildings	X								
TC10.01	Industrial Refrigeration and Piping Systems					X				
Multidisciplinary Task Groups										
MTG.BIM	Building Information Modeling		X							
MTG.LowGWP	Lower Global Warming Potential Alternative Refrigerants									X

Attendance: https://forms.gle/CcscQ5iohYYeVNuQA

MTG.CYB

Ecton English

Expertise for Energy DOE/LBNL Center of DOE/LBNL Center of Efficiency in Data Centers (CoE)

datacenters.lbl.gov

Steve Greenberg, PE

ASHRAE TC 9.9

February 6, 2023

Activities Update

- Upcoming
  - **DOE Data Center Energy Practitioner Program – An Introduction: Feb. 14**
  - **Data Center Energy Usage Report kickoff workshop: mid-April**
  - **Understanding the Headwinds to Data Center Efficiency: May**
- Recent webinars include:
  - **Computer Server Selection Guidelines for Energy Efficiency and Decarbonization in Data Centers**
  - **System-Level Tools for Identifying and Quantifying Carbon Reduction Opportunities in Data Centers**

DOE Data Center Energy Practitioner (DCEP)

- **Upcoming virtual trainings in March & May**
- **Visit datacenters.lbl.gov/dcep for training**
- **LinkedIn Group**

DOE/LBNL Center of Expertise (CoE)

Use CoE's Energy Efficiency Toolkit.

Filter CoE's many resources by type and topic.

Choose from upcoming live webinars, pre-recorded trainings, and in-person Data Center Energy Practitioner (DCEP) trainings.

Search resources by topics of interest.

Explore the Center's diverse activities.

Follow us on Twitter @DataCenterCoE

Visit us at datacenters.lbl.gov

Resources

New:

- Computer Server Selection Guidelines for Energy Efficiency and Decarbonization in Data Centers (Report)
- Accessing Onboard Server Sensors for Energy Efficiency in Data Centers (Report)
- Organizational and psychological measures for data center energy efficiency: barriers and mitigation strategies (Energy Efficiency Journal)

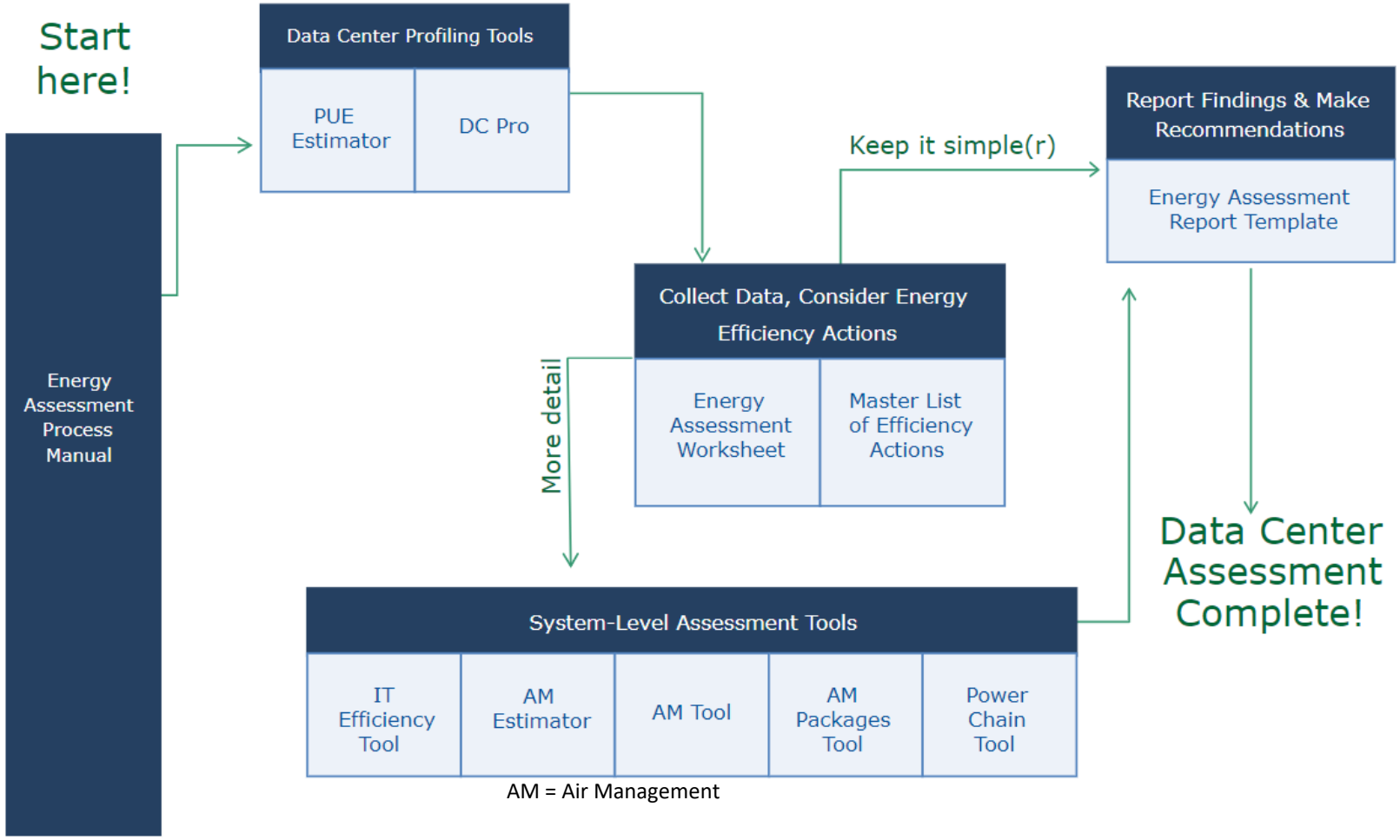
Updated:

- IT Equipment Energy Assessment Tool
- Electrical Power Chain Tool
- Air Management Tool

Stay up to date!

- Quarterly newsletter with announcements on upcoming webinars, tools, and more.
- Email us at CoE@lbl.gov to subscribe or fill out our interest form.
- Follow us on Twitter @DataCenterCoE

DOE/LBNL Data Center Energy Efficiency Toolkit



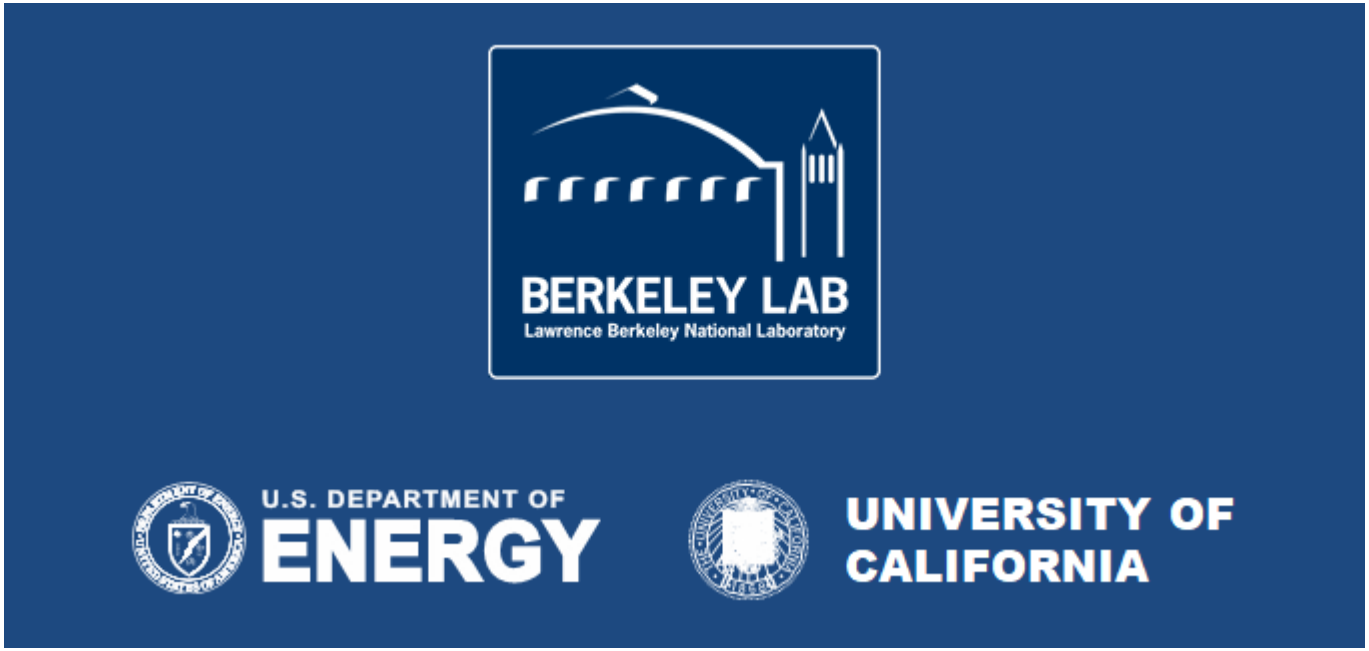
AM = Air Management

For More Information

Email: CoE@lbl.gov

Web: datacenters.lbl.gov

Follow us on Twitter @DataCenterCoE



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Attendance

ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2023 Winter Meeting

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Contact us at tc99chair@gmail.com
Technical Committee Website: http://tc0909.ashraetcs.org

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Or use the QR Code below:

Monday - IT Subcommittee Main Meeting(Room A311) – 45 min (4:50 – 5:35 PM)

Liquid Pressure Test for Servers – Roger
Intro Liquid Cooling Book – Roger
Liquid Cooling Book Status – Dustin

Monday - IT Subcommittee Breakout meeting(A312) – 70 min (5:50 – 7:00 PM)

Thermal Guidelines Envelope Issues
H class usage
IEC Safety STD – touch temp
Liquid Cooling Book Work items
Future Technical Briefs – Liquid Cooling and Power Trends
Interim(to ASHRAE Conf.) IT Zoom meetings - Discussion items with Entire IT Team

Pressure Testing Requirements for IT Liquid Components – the problem

- IEC 62368-1: 2014, (2nd edition) published on Feb 2014, : "… one sample of LFC is subjected to a hydrostatic pressure test for 2 min at room temperature and a pressure that is 5 X that maximum working pressure specified by the manufacturer at the maximum temperature measured during normal operating conditions."

- Noting that when the liquid cooling loop is driven by a CDU or a facility cooling system the required test pressure could be well over 100 psig and could cause problems for some of the heat transfer components.

- Of particular interest are the cold plates that would be attached to the silicon components. These are generally thin, rectangular components where the lid could deform at high pressures.

- TC 9.9 expressed concern of the IEC 62368-1 committee to pressure test liquid filled components(LFC) to 5X maximum working pressure.

Roger Schmidt c28rrs@us.ibm.com

Pressure Testing Requirements for IT Liquid Components – the solution

- In 2018 the IEC committee responsible for IEC 62368-1 informed TC 9.9 that the 3rd edition had been modified such that the 5X value was changed to 3X .

- The 4th edition of IEC 62368-1 is the one where we will first see the adjusted testing requirements that will apply to high end equipment that uses liquid cooling.
  - a) Section G.15.3, describes testing requirement for modular LFC, (high end equipment that connects to facilities). *One sample of the **LFC** or **LFC Assembly** is subjected to a hydrostatic pressure test for 2 min at room temperature at a pressure that is 1.5 times the maximum rated working pressure of the **LFC** or **LFC Assembly***
  - b)Plan is for the 4th edition to be approved and published early summer 2023

Pressure Testing Requirements for IT Liquid Components – clarifications

The discussions and review of this topic did make the TC aware that this topic is confusing and needing additional guidance for the end user. The following is intended to make this clearer.

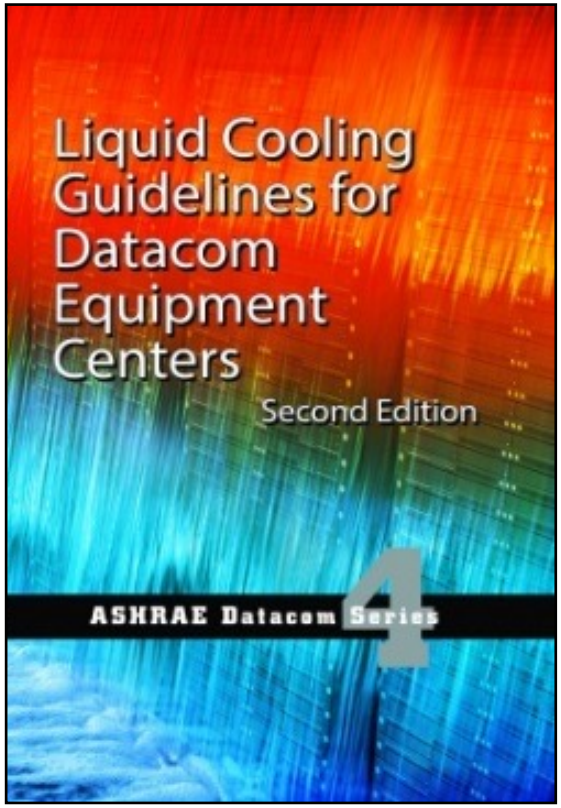
- Pressure testing the IT equipment at the data center is not recommended; beyond checking for leaks when the final connection is made. The IT manufacturer is responsible for ensuring the equipment is sound when it is shipped. This equipment or assembly may be at the blade or server level up to the rack or rack/CDU combination. Shutting down or taking off-line operating IT equipment such that new assemblies could be pressure tested when added to a liquid loop in the field is exactly what should be avoided.

- The IT manufacturer is responsible for the pressure testing of the assembly they will ship. This is generally done to the IEC code.

- The end-user and/or their construction contractor is responsible for the pressure testing of the site designed and installed interconnect piping/hosing between the site-based systems and IT supplied hardware. This is generally done to the ASME B31.3 (or international equivalent) code. This is typically done prior to the installation of the IT kit.

- It is the responsibility of the end-user/owner to ensure that the IT equipment pressure rating exceeds that of the cooling loop that it will ultimately be attached to. Detailed discussions between the owner, IT supplier and CDU supplier (if different than the IT supplier) are strongly recommended.

Plans to update 2nd Edition of the Liquid Cooling Guidelines



Chapter 1 – Introduction

Chapter 2 – Facility Cooling Systems

Chapter 3 – Facility Piping Design

Chapter 4 – Liquid Cooling Implementation for Datacom Equipment

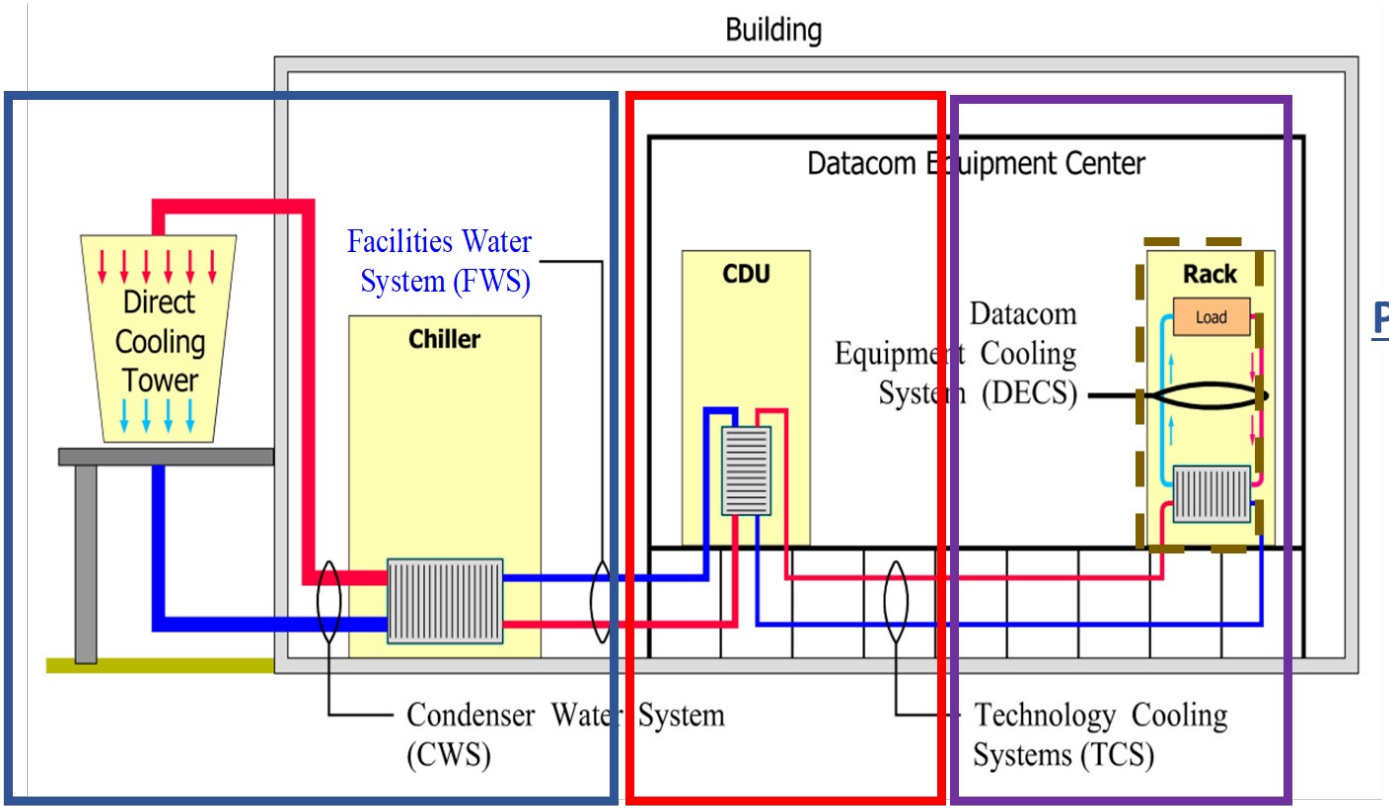
Chapter 5 – Liquid Cooling Infrastructure Requirements for Chilled-Water Systems

Chapter 6 – Liquid Cooling Infrastructure Requirements for Technology Cooling Systems

Appendix

Six ASHRAE publications on Liquid Cooling to consider integrating into new book

- ❑ Liquid Cooling Guidelines – 2nd edition, 2014, 92 pgs.
- ❑ IT Equipment Design Impact on Data Center Solutions, 10 pgs., Chapter 3
- ❑ Thermal Guidelines for Data Processing Environments – 4th edition,15 pgs.,Chapter 3
- ❑ Emergence and Expansion of Liquid Cooling, 2021, 22 pgs.
- ❑ Water Cooled Servers: Common Designs, Components and Processes, 2019, 43 pgs.
- ❑ Liquid Cooling Whitepaper Brief, 2019 , 3 pgs.



Part 1:Technology Trends

5 pgs.-Liquid Cooling Bk – 2nd
5 pgs.-Components WP
20 pgs.-Technology Emergence
3 pgs.-Liquid Cooling Brief

65 pgs.-Liquid Cooling Bk – 2nd
12 Pgs – Thermal Guidelines – 4th

Part 2: Facilities

5 pgs.-Liquid Cooling Bk-2nd
20 pgs.-Components

20 pgs.-Liquid Cooling Bk-2nd
20 pgs.-Component Whitepaper
10 pgs.-IT Equipment Design Impact Bk
5 pgs.-Immersion Cooling

Part 3: Technology and Cooling Systems

Given the interest and amount of materials to incorporate we decided to form 3 groups as shown on the last slide :

- Part 1: Technology led by Dave Moss(David.Moss@dell.com)
- Part 2: Facilities led by Dustin Demetriou(dwdemetr@us.ibm.com)
- Part 3: Technology and Cooling Systems led by Mark Steinke(Mark.Steinke@amd.com)

If you have an interest please send a note of your interest to the team leader. To keep a balance of people it is best to sign up to just one part to help with the writing.

Liquid Cooling Book Update

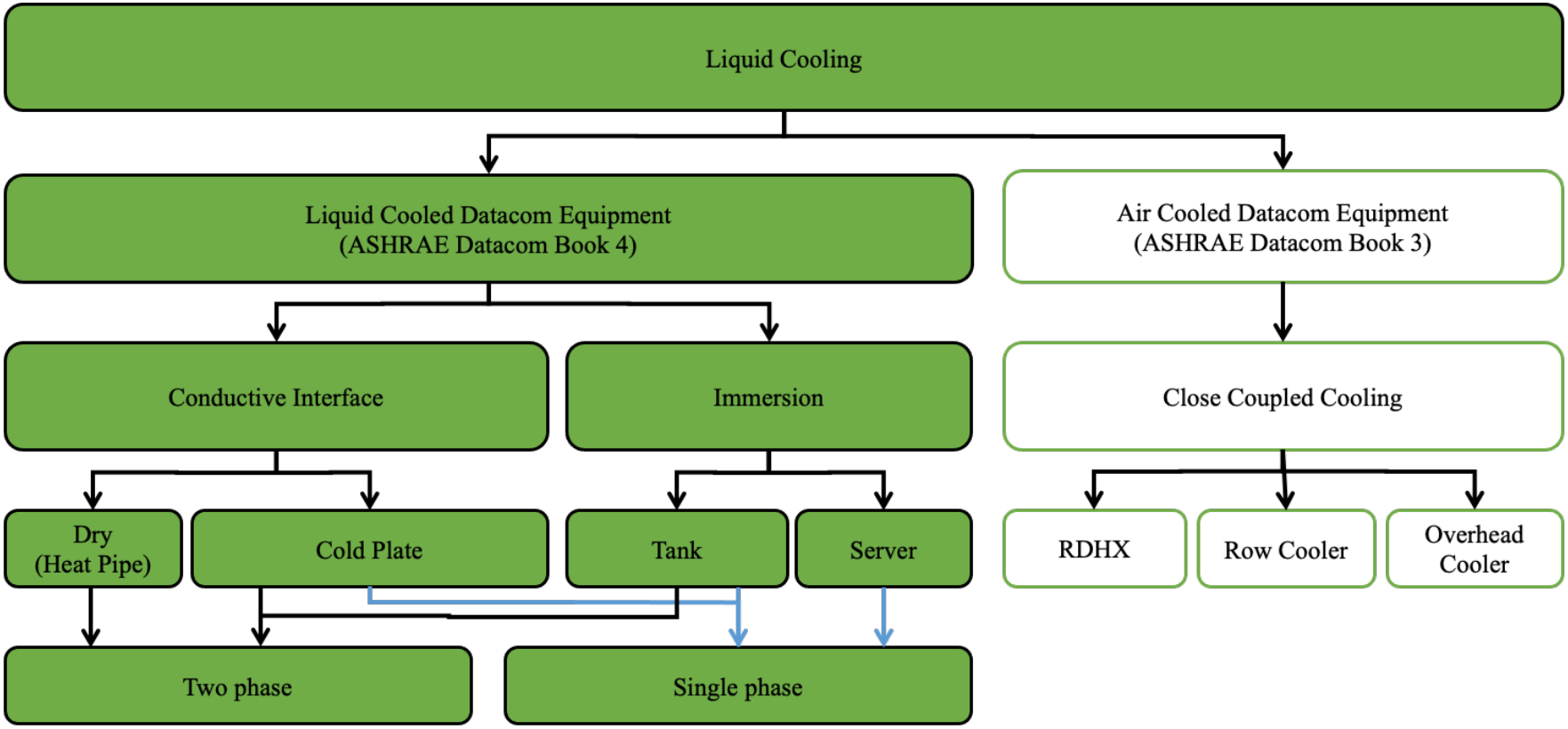
Dustin Demetriou

Attendance: https://forms.gle/uR4n7Scq5G6TWar7A

Overview

- “Facilities” and “IT” groups efforts were merged into a single document in December 2022
- 10 chapters, 4 appendix, 185 pages
- Content mostly complete
- Significant new content added on:
  - Water cooling components (from white paper)
  - Immersion cooling
  - Clarity on FWS vs. TCS
  - TCS temperature classification
  - Emerging trends and liquid cooling adoption

Classification



Chapters

1. Introduction
   - Overview
   - Publication editions
   - Definitions
   - Liquid cooling systems
   - Emerging trends driving the adoption of liquid cooling
   - Liquid cooling adoption
2. Facility Cooling Systems
   - Equipment
   - Piping
   - Approach temperature
   - Economizer modes
3. Liquid Cooling Implementations
   - Liquid cooled racks
   - Liquid cooled IT equipment
4. Coolant Distribution Unit
   - Implementations
   - Design considerations
   - Approach temperature
   - Piping consideration

Chapters

5. Liquid Cooling Infrastructure Facility Cooling Systems
   - FWS temperature classification
   - FWS considerations
6. Liquid Cooling Infrastructure Technology Cooling Systems
   - TCS temperature classification
7. Fluids and Fluid Quality
   - Coolants
   - Quality requirements
   - Wetted materials
   - Water quality
   - Filtration
   - Monitoring and maintenance
8. Conductive Liquid Cooling
   - Rack level components
   - Server level components
   - Quick disconnects
   - Hoses
   - Pressure testing

Chapters

9. Immersion Cooling
    - Two phase
    - Single phase
    - IT considerations
10. Additional considerations
    - Electrical
    - Monitoring and controls
    - Reliability and availability
    - Commissioning
    - NEBS compliant spaces
    - Fire detection and suppression
    - Transition to liquid cooling
    - Modeling
- References
- Glossary of Terms
- Appendix A: Performance limitations of liquid cooling
- Appendix B: Requirements for Immersion Fluids
- Appendix C: Heat Transfer Models
- Appendix D: Liquid Cooling System Commissioning

Next Steps

- Finalize content
  - Designing for the transition to liquid cooling
  - IT consideration for immersion cooling
- Editing and clean up

Monday - IT Subcommittee Main Meeting(Room A311) – 45 min (4:50 – 5:35 PM)
Teams Meeting – Meeting ID: 299 090 189 603 / Passcode BtJpNW

Liquid Pressure Test for Servers – Roger
Intro Liquid Cooling Book – Roger
Liquid Cooling Book Status – Dustin

Monday - IT Subcommittee Breakout meeting(A312) – 70 min (5:50 – 7:00 PM)
Teams Meeting – Meeting ID: 237 515 786 807 / Passcode 4JiTLJ

Thermal Guidelines Envelope Issues
H class usage
IEC Safety STD – touch temp
Liquid Cooling Book Work items
Future Technical Briefs – Liquid Cooling and Power Trends
Interim Zoom meetings and discussion items with Entire IT Team

Thank You

TC 9.9 Website:

tc0909.ashraetcs.org

Attendance: https://forms.gle/uR4n7Scq5G6TWar7A

Attendance

ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2023 Winter Meeting

Programs, Research, & Publications
Virtual Event Timing: Sunday February 5, 2023; 6:00-8:00 pm ET
Event Address: Link
Meeting ID: 225 016 118 130
Passcode: 7zUxeq

Virtual Event Timing: February 6, 2023; 2:30 - 7:00 pm ET
Event Address: Link
Meeting ID: 268 959 024 61
Passcode: YpPqdW

Contact us at tc99chair@gmail.com
Technical Committee Website: http://tc0909.ashraetcs.org

Attendance is being recorded using a Google Form. Please make sure you complete the form at:

https://forms.gle/CcscQ5iohYYeVNuQA

Or use the QR Code below:

Current Work Items

General TC9.9 Work Items

		Status	Expected Completion	Membership	Contact
Research	1675-RP, Guidance for CFD Modeling of Data Centers	On-going	3Q2021	Closed	Mark Seymour mark.seymour@futurefacilities.com
Standards	SSPC 127, Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners	On-going	Continuous	Open	John Bean jbean@grcooling.com
Standards	AHRI 1360, Performance Rating of Computer and Data Processing Room Air Conditioners	On-going	Continuous	Closed	David Kelley kelleydave9@gmail.com
Standards	ANSI/ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residentail Buildings	SSPC	Continuous	Closed	Richard Pavlak rlpavlak@heapy.com
Standards	ANSI/ASHRAE 90.4, Energy Standard for Data Centers	SSPC	Continuous	Closed	David Kelley kelleydave9@gmail.com
Handbook	HVAC Applications, Chapter 20, Data Centers and Telecommunication Facilities	On-going	Continuous	Open	Bob McFarlane rmcfarlane@smwllc.com

IT Subcommittee

		Status	Expected Completion	Membership	Contact
White Paper	Liquid Cooling Guidelines for Datacom Equipment Centers 3rd Edtion	On-going	2023	Open	Roger Schmidt c28rrs@us.ibm.com

Facilities Subcommittee

		Status	Expected Completion	Membership	Contact
Datacom Book	Design Considerations for Datacom Equipment Centers, 2nd Edition	In Review	4Q2021	Open	John Gross john@jmgrossengineering.com
White Paper	Data Center Cooling Resiliency	On-going	2022	Open	Mark Mannex markm@mannex-eng.com

Attendance: https://forms.gle/uR4n7Scq5G6TWar7A

ICC-2024 UL/CSA 60335-2-40 ASHRAE Std. 15

Ben Dolcich

International

Don Beaty

Attendance: https://forms.gle/uR4n7Scq5G6TWar7A